

1 Labelless, Rolled Food Item And Its Fabrication
 BACKGROUND

 The present invention generally relates to food
items, particularly to rolled food items, more
5 particularly to coils of food supported on support
material, and specifically to rolled food items or the
like at least temporarily retained in a coiled condition
without the use of a label during its fabrication.

 The sale of snack-type food products is a highly
10 competitive business. In addition to the particular food
components, increasingly the novelty and play value of
the product are important in the marketability of any
particular food item. For example, fruit-based snack
products such as FRUIT ROLL-UPS™ fruit products have
15 found wide market acceptance. Likewise, U.S. Patent
No. 4,882,175 recognized the enhanced marketability of
chewing gum in the form of a rolled-up tape allowing the
consumer the chance to break off the desired size of
piece to chew, saving the rest for later.

20 Many foods such as dehydrated fruit puree do not lend
themselves to forming rolled food items such as where the
food is in a strip of a thinness generally requiring
external support and/or where the food tends to stick to
itself such that it creates a single mass which can not
25 be unrolled. In such cases, support material and food
supported thereon are rolled into a coil creating a
novelty form of merchandising for that food. For
example, FRUIT BY THE FOOT™ fruit products of the type
disclosed in U.S. Patent Nos. 5,455,053 and 5,723,163 have
30 enhanced play value which is believed to promote the
marketability thereof.

 During the fabrication of rolled food items,
provisions have to be made to prevent the food item from
unrolling during fabrication such as in the wrapping and
35 other packaging operations. A prior preferred method to
prevent undesired unrolling is the application of a label
extending over the trailing edge of the support material.

1 In addition to its functional aspects, the labels used to
hold the rolled food items in a coiled condition can add
to the novelty and play value of the rolled food item.
Particularly, the label often includes graphics which are
5 visually appealing to the typical consumer of the food of
the rolled food item and/or which promote the future
purchase of the rolled food item. However, problems arose
from the labels which had not been appropriately discarded
after their removal from the rolled food item being
10 difficult to remove when adhered to surfaces such as desk
tops. One solution to this problem was to provide novel
labels for such rolled food items such as of the type
disclosed in U.S. Patent Appln. No. 08/888,803 filed July
7, 1997, which is hereby incorporated herein by reference.

15 Another prior method to prevent unintentional
unrolling is to utilize an edible adhesive such as corn
syrup. However, corn syrup and similar adhesives have
certain negatives including being an additive to the food
which could affect its taste, texture, and/or appearance,
20 being messy while eating and also during application and
fabrication and being generally difficult to work with.

Accordingly, it is an object of the present invention
to provide novel apparatus and methods for fabrication of
a novel rolled food item which, in the preferred form, is
25 retained at least temporarily in a coiled condition during
fabrication such as in the wrapping and other packaging
operations without the use of a label and which overcomes
the negatives associated with the use of corn syrup and
similar food adhesives.

30 Another object of the present invention is to allow
the retention of the rolled food item in a coiled
condition without the use of a label and without
significant change to existing fabrication equipment and
its operating conditions.

35 SUMMARY

Surprisingly, the above objectives and other problems
can be satisfied in the field of rolled food items and

1 their fabrication by providing, in the preferred form, a
first portion of the food adjacent the trailing edge
having a moisture content greater than the remaining
portions of the food and sufficient to increase the
5 tackiness of the food to be adherable to the support
material to retain the support material and food in a roll
and to at least temporarily prevent unintentional
unrolling of the roll during fabrication of the rolled
food item.

10 In the preferred form, the first portion of the food
is formed by spraying a source of moisture, and in the
most preferred form a food grade water free of adhesive
type additives, onto the food adjacent to the trailing
edge prior to its rolling into the roll.

15 The present invention will become clearer in light of
the following detailed description of an illustrative
embodiment of this invention described in connection with
the drawings.

DESCRIPTION OF THE DRAWINGS

20 The illustrative embodiment may best be described by
reference to the accompanying drawings where:

Figure 1 shows a top plan view of a strip of support
material and food according to the preferred teachings of
the present invention, with portions broken away.

25 Figure 2 shows a side elevational view of the strip of
support material and food of Figure 1 rolled into a roll
to form a rolled food item.

Figures 3a and 3b show diagrammatic side elevational
views of the apparatus for rolling the strip of support
30 material and food of Figure 1 to form the rolled food item
of Figure 2.

All figures are drawn for ease of explanation of the
basic teachings of the present invention only; the
extensions of the figures with respect to number,
35 position, relationship, and dimensions of the parts to

1 form the preferred embodiment will be explained or will
be within the skill of the art after the following
description has been read and understood. Further, the
exact dimensions and dimensional proportions to conform
5 to specific force, weight, strength, and similar
requirements will likewise be within the skill of the
art after the following description has been read and
understood.

Where used in the various figures of the drawings,
10 the same numerals designate the same or similar parts.
Furthermore, when the terms "first", "second", "edge",
"end", "transverse", "longitudinal", "width", "length",
"height", "inner", "outer", "leading", "trailing", and
similar terms are used herein, it should be understood
15 that these terms have reference only to the structure
shown in the drawings as it would appear to a person
viewing the drawings and are utilized only to facilitate
describing the illustrative embodiment.

DESCRIPTION

20 A rolled food item according to the preferred
teachings of the present invention is shown in the
drawings and generally designated 110. In the most
preferred embodiment of the present invention, rolled
food item 110 is an improvement of the type shown and
25 described in U.S. Patent Nos. 5,205,106; 5,284,667;
5,455,053 and 5,723,163. For purpose of explanation of
the basic teachings of the present invention, the same
numerals designate the same or similar parts in the
present figures and the figures of U.S. Patent Nos.
30 5,205,106; 5,284,667; 5,455,053 and 5,723,163. The
description of the common numerals and rolled food item
110 may be found herein and in U.S. Patent Nos. 5,205,106;
5,284,667; 5,455,053 and 5,723,163, which are hereby
incorporated herein by reference.

35 Generally, rolled food item 110 includes strips of

1 food 14 and support material 16 simultaneously rolled
about its leading edge or end 136 into a coil. Food 14 is
of a thinness requiring external support by support
material 16. In the most preferred form, food 14 is a
5 sweetened dehydrated fruit-based material typically
referred to in the art as a fruit leather which can be
derived from fruit purees and in the most preferred form
is of the same type as utilized in the first, solid or
"hard" portion or region of the dual textured food piece
10 described in U.S. Patent No. 4,847,098 issued July 11,
1989 to J.E. Langler and in U.S. Patent No. 4,853,236
issued August 1, 1989 to J.E. Langler, each entitled Dual
Textured Food Piece of Enhanced Stability and each of
which is hereby incorporated herein by reference.

15 Support material 16 may be formed of any suitable
material such as silicon parchment paper which has the
necessary strength to support food 14 without tearing and
without bulkiness to allow rolling of food 14 and support
material 16 into a compact food piece and which allows
20 food 14 to be easily separated therefrom for consumption.

In the preferred form, the strip of food 14 has side
edges spaced inwardly from the side edges of the strip of
support material 16 and in the most preferred form are
spaced in the order of one sixteenth inch (1.6 mm)
25 inwardly from the side edges of the strip of support
material 16. Depending upon the method of fabrication,
spacing the strip of food 14 inward of the side edges of
the strip of support material 16 is advantageous as food
14 has less tendency to rub against the fabrication
30 equipment which is undesirable as the side edges of the
strip of food 14 could acquire an unsightly or otherwise
undesirable appearance and as food 14 could build up or
otherwise collect on the fabrication equipment requiring
extra cleaning and maintenance. In the preferred form,
35 the strip of food 14 does not extend beyond the leading
end 136 and trailing edges or ends 138 of the strip of

1 support material 16 and in the most preferred form has a
length equal to the length of the strip of support
material 16 so that leading and trailing ends 136 and 138
of the strip of food 14 are coextensive with leading and
5 trailing ends 136 and 138 of the strip of support material
16. Specifically, in the most preferred form, the strips
of food 14 and support material 16 are formed continuously
and are simultaneously cut to length such as by a water
knife. In the preferred form, the width of the strip of
10 support material 16 is minimal relative to its length and
in the most preferred form, the strip of support material
16 has a width in the order of one and one-eighth inch
(2.9 cm) and a length in the order of 36 inches (1 meter).

The strips of food 14 and support material 16 are
15 rolled around their leading edges or ends 136 into the
coil having multiple rotations with the strip of support
material 16 located on the outside of the roll or coil and
with trailing edge 138 of the strips of food 14 and
support material 16 located on the outside or periphery of
20 the roll or coil. In the most preferred form, when the
strips of food 14 and support material 16 are rolled, the
periphery of the coil or roll is in the order of four and
five-eighths inches (11.7 cm).

In the production of rolled food item 110, generally
25 one or more strips of food 14 and support material 16 are
transported in a generally planar condition such as on a
conveyor 140 towards a roll-up section 76. It can be
appreciated that strips of food 14 and support material 16
can be formed in a variety of manners according to the
30 teachings of the present invention including but not
limited to the type disclosed in U.S. Patent Nos.
5,205,106; 5,284,667; 5,455,053 and 5,723,163. Similarly,
roll-up section 76 can be of a variety of forms according
to the teachings of the present invention including but
35 not limited to the type utilizing a reciprocable,
rotatable tuning fork disclosed in U.S. Patent Nos.

1 5,205,106; 5,284,667; 5,455,053 and 5,723,163.

According to the teachings of the present invention, rather than providing a labeler and a label smasher as in U.S. Patent Nos. 5,205,106; 5,284,667; 5,455,053 and
5 5,723,163, one or more spray nozzles 142 are provided vertically above and spaced from conveyor 140 and spaced in a manner to not physically contact the strips of food 14 and support material 16 on conveyor 140 and upstream of roll-up section 76. According to the teachings of the
10 present invention, nozzles 142 spray a source of moisture in the preferred form of a liquid consisting of food grade water. In the preferred form, the water is free of adhesive type additives such as corn syrup and in the most preferred form is free of all additives.

15 In a preferred form, a fewer number of nozzles 142 are provided than the number of strips of food 14 and support material 16, with each nozzle 142 spraying a source of moisture over more than one strip of food 14 and support material 16. In this regard, four nozzles 142 could be
20 provided to spray ten strips of food 14 and support material 16. In other forms, a separate nozzle 142 can be associated and transversely aligned with each strip of food 14 and support material 16. In such preferred forms, each nozzle 142 can have a spray pattern having a
25 transverse width less than the width of the strip of support material 16, preferably less than the width of the strip of food 14, and most preferably approximately two thirds the width of the strip of food 14.

According to the teachings of the present invention,
30 operation of each nozzle 142 is not continuous, but rather nozzles 142 spray a deposit 144 adjacent to trailing end 138 of the strips of food 14 and support material 16 and in the most preferred form with deposit 144 having a trailing end coextensive with the trailing end 138 of the
35 strips of food 14 and support material 16, with deposit 144 extending upstream from trailing end 138. Deposit 144 which defines a first portion has a relatively short

1 length considerably shorter than the remaining, second
portion of the strips of food 14 and support material 16
and than the total elongated length of the strips of food
14 and support material 16, with deposit 144 in the most
5 preferred form being generally 10% of the elongated length
of the strips of food 14 and support material 16. In the
preferred form shown, deposit 144 has side edges spaced
inwardly from and parallel to the side edges of food 14.
According to the teachings of the present invention, the
10 remaining second portions of the strips of food 14 and
support material 16 (other than deposit 144) are free of
spray liquid. In this regard and in the most preferred
form, air is blown through nozzles 142 after supply of the
spray liquid has been terminated to nozzles 142 to remove
15 any droplets of spray liquid that have remained in the tip
of nozzles 142 to insure that such droplets fall in deposit
144 and not after leading edge 136 of the next strip of food
14 and support material 16.

Food 14 as processed during fabrication has a moisture
20 content which enhances its shelf life, and particularly has
a moisture content which does not result in food 14
undesirably degrading during normal storage times before
consumption. With this moisture content, food 14 has a
tackiness which may adhere to support material 16 when
25 rolled into a roll but typically which is insufficient to
prevent unintentional unrolling during further fabrication
processes such as wrapping and other packaging operations.
However, food 14 within deposit 144 has an increased
moisture content so that food 14 becomes sticky or in
30 other words has an increased tackiness sufficient to
adhere to support material 16 in the roll to prevent
unintentional unrolling of the roll at least temporarily
during further fabrication processes. In the most
preferred form, food 14 is fabricated in a continual
35 process and has a constant consistency (aside from
moisture content) between the leading and trailing ends
136 and 138. In this regard, food 14 itself adheres to

1 support material 16 and specifically food 14 does not
include an additive or adhesive which secures food 14 to
support material 16.

The strips of food 14 and support material 16
5 including deposit 144 can be rolled in roll-up section 76
in the conventional manner so that support material 16 is
located on the outside of the roll, trailing edge 138 is
located on the periphery of the roll, and leading edge 136
is located adjacent the center of the roll and in the most
10 preferred form, with the strip of support material 16 and
food 14 being rolled around leading end 136 which is cut
and into a roll having multiple rotations. According to
the teachings of the present invention, deposit 144 will
cause food 14 adjacent to trailing end 138 to adhere to
15 support material 16 on the underlying wind of rolled food
item 110 and specifically without requiring the use of a
label. It should be appreciated that roll-up section 76
can include a pressure plate such as of the type disclosed
in U.S. Patent Nos. 5,205,106; 5,284,667; 5,455,053 and
20 5,723,163 to place pressure upon and to adhere food 14 of
increased tackiness within deposit 144 to support material
16 to thus secure the strip of food 14 and support
material 16 in a rolled or coiled condition during later
fabrication steps such as in wrapping and other packaging
25 operations.

The spray liquid should be applied by nozzles 142 in
deposits 144 in an amount so that food 14 develops
sufficient tackiness to be adherable to the strip of support
material 16. Specifically, the adhesion of food 14 on
30 support material 16 depends on the viscoelastic and the
surface tension properties of food 14. Support material 16
is silicone coated in the most preferred form to achieve
just enough cohesive bond between food 14 and support
material 16, such that the former remains attached to the
35 later during processing and storage. However, food 14 peels
easily off support material 16 for consumption. Studies
with adhesive strength of synthetic films showed that the

1 higher the wettability of the film, the greater the adhesive
strength between the product and the film. The normal water
activity of food 14 does not allow support material 16
(whose wettability has been reduced by silicone coating in
5 the preferred form) to adhere to trailing edge 138 of food
14 during the formation of rolled food item 110. According
to the teachings of the present invention, the water
activity of food 14 within deposit 144 at trailing edge 138
was increased by the application of the spray liquid just
10 before rolling in roll-up section 76. Because of the
viscoelastic nature of food 14, the pressure applied in
roll-up section 76 to trailing edge 138 of rolled food item
110 helps in the adhesion of deposit 144 of food 14 to the
body of the roll. It was observed that too much moisture in
15 food 14 also decreases the adhesion characteristics of food
14.

In this regard, a method was devised to measure the
adhesion strength of the formed rolled food item 110. A
texture analyzer, Model XT2, made by Stable Micro Systems,
20 England was used for this purpose. The sample holder
consisted of an aluminum rod hinged between two clamps,
which in turn were attached to a wooden base. The whole
assembly was attached to the texture analyzer in such a way
that the rod is positioned horizontally, crossways to the
25 operator, directly beneath the probe of the texture
analyzer. A sample rolled food item 110 was collected as
soon as rolled food item 110 was formed in roll-up section
76. A 1.2 cm by 1.2 cm VELCRO sticky back square was gently
taped to rolled food item 110 in such a way that trailing
30 edge 138 of support material 16 aligns with an edge of the
square. Rolled food item 110 was slipped into the aluminum
rod and was placed in contact with the probe of texture
analyzer already equipped with a complementary VELCRO sticky
back square. The rod was then secured between the clamps,
35 and the tensile strength required to peel trailing edge 138

1 of rolled food item 110 was recorded. The separation speed
of the probe was set at 2 mm/sec.

For proper adhesion of trailing edge 138 of the strip of
support material 16 and food 14 to the roll body, a minimum
5 adhesive strength of 42 grams-force/cm², measured through the
peel off test as described above, was required. An adhesive
strength of 100 to 300 grams-force/cm² was found to be
optimum. A water activity above 0.59 in deposit 144 gives
proper adhesion of rolled food item 110. However, a water
10 activity above 0.64 results in less tacky products. The
optimal range therefore, is 0.59-0.64 water activity for
food 14 after the application of the spray liquid.

It should be appreciated that after fabrication has
been completed, the spray liquid within deposit 144 over
15 time may decrease such as the result of evaporation or
dispersion throughout the remaining portions of food 14 to
be of an amount to reduce its tackiness, even to an amount
which is insufficient to adhere food 14 to the strip of
support material 16. However, the forces which would tend
20 to unintentionally unroll rolled food item 110 is
considerably less after fabrication. In fact after
fabrication, reduction of tackiness may desirably increase
the ease at which rolled food item 110 can be initially,
intentionally unrolled by the consumer. Additionally, the
25 evaporation and/or dispersion of the spray liquid from
deposit 144 is also advantageous in the reduction of the
possibility of the degradation of food 14 in deposit 144
as the result of the increased moisture content including
but not limited to molding. In this regard, it should be
30 appreciated that if nozzles 142 were operated continuously
or in a manner to spray substantial portions of the strip
of food 14 and support material 16 in an amount to develop
adhering tackiness, the shelf life of the resulting rolled
food item could be significantly reduced to an extent
35 which would make it unmarketable.

1 Rolled food item 110 according to the teachings of the
present invention is advantageous over prior rolled food
items. In particular, the strip of food 14 and support
material 16 is contacted only by a spray and in particular
5 is not mechanically contacted such as required during the
application of labels. Further, in the most preferred
form, only water is added and particularly no other food
ingredient such as corn syrup is added which could affect
the consistency, taste or appearance of food 14.
10 Additionally, problems in the handling of corn syrup or
like food additives including clogging additive passages
and stickiness when contacting other surfaces and
apparatus components including the cleaning thereof is
avoided when water is utilized. In fact, existing
15 fabrication equipment can be easily modified by the simple
replacement of the labeler and associate label applying
accessories or other fabrication unrolling prevention
provisions with nozzles 142. In the preferred form with
only water being sprayed, clogging and cleaning
20 requirements of nozzles 142 are minimized in comparison to
the problems associated with moving and cleaning corn
syrup or similar food adhesives. Additionally, the
fabrication and inventory costs for labels as well as the
capital costs associated with the fabrication and
25 application of such labels are avoided. Thus, existing
fabrication equipment and its operating conditions can be
utilized without significant change and in many cases with
more trouble free operation.

Now that the basic teachings of the present invention
30 have been explained, many extensions and variations will
be obvious to one having ordinary skill in the art. For
example, although the operation of spray nozzles 142 is
shown while the strip of food 14 and support material 16
is being rolled adjacent to its leading end 136, deposit
35 144 can be provided at any position upstream of roll-up
section 76 including while the strip of food 14 and
support material 16 is generally in a planar condition

1 according to the teachings of the present invention.
Similarly, although the operation of spray nozzles 142
is shown while the strip of food 14 and support material
16 is of its marketable length, deposit 144 can be sprayed
5 on food 14 and support material 16 prior to cutting into
multiple strips and/or cutting to length according to the
teachings of the present invention when food 14 is
continuously applied to continuous roll stock of support
material 16.

10 Thus since the invention disclosed herein may be
embodied in other specific forms without departing from
the spirit or general characteristics thereof, some of
which forms have been indicated, the embodiments
described herein are to be considered in all respects
15 illustrative and not restrictive. The scope of the
invention is to be indicated by the appended claims,
rather than by the foregoing description, and all changes
which come within the meaning and range of equivalency of
the claims are intended to be embraced therein.